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EXAMINER

GANDHI, DIPAKKUMAR B

ART UNIT	PAPER NUMBER
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2133

DATE MAILED: 03/11/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

7

Office Action Summary	Application No.		Applicant(s)	
	09/817,731		PERSSON ET AL.	
	Examiner		Art Unit	
	Dipakkumar Gandhi		2133	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-40 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-40 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 26 March 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☒ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. ____. |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date ____. | 6) <input type="checkbox"/> Other: ____. |

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DETAILED ACTION

Oath/Declaration

1. A new oath or declaration is required because the second inventor has not signed and dated the oath/declaration.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

4. Claim 1-2, 4, 16-19, 21-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Naguib et al. (Increasing data rate over wireless channels, May 2000, IEEE Signal Processing Magazine, Volume: 17, Issue: 3, Pages: 76-92) in view of Soliman (US 2002/0114288 A1).

As per claim 1, Naguib et al. teach introducing multidimensional diversity into at least the weak link component to generate a plurality of de-correlated signals associated with the weak link component; and selectively combining received ones of the plurality of de-correlated signals which, when demodulated, provides a representation of content originally transmitted in the received signals (figure 13, pages 77, 85-86, 89, Naguib et al.).

However Naguib et al. do not explicitly teach the specific use of detecting a weak link component in the wireless communication link.

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Soliman in an analogous art teaches that this invention relates to digital wireless communication systems (page 1, paragraph 2). Soliman also teaches detecting and processing calls in a weak forward link environment. The method shown in FIGS. 2 and 3 detects whether a forward link failure is due to a weak forward link, and processes calls appropriately (figures 2, 3, page 7, paragraphs 59-60, Soliman).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Naguib et al.'s patent with the teachings of Soliman by including an additional step of detecting a weak link component in the wireless communication link.

This modification would have been obvious to one of ordinary skill in the art, at the time the invention was made, because one of ordinary skill in the art would have recognized that detecting a weak link component in the wireless communication link would provide the opportunity to use diversity techniques to improve the data rate.

- As per claim 2, Naguib et al. and Soliman teach the additional limitations.

Soliman teaches detecting a weak link component comprises: monitoring one or more operational characteristics of each of an uplink and downlink component of a wireless communication link (page 1, paragraphs 2, 5, page 3, paragraph 28, Soliman); and comparing the monitored characteristic(s) against a threshold associated with each of the one or more characteristics (page 10, claims 15-16, Soliman).

- As per claim 4, Naguib et al. and Soliman teach the additional limitations.

Naguib et al. teach that multidimensional diversity includes diversity in two or more of the space, time and/or frequency domains (page 77, Naguib et al.).

- As per claim 16, Naguib et al. and Soliman teach the additional limitations.

Claim 16 follows the same limitations as claim 1. See rejection to claim 1, above. Claim 16 is rejected under the same rationale as to claim 1 rejected above.

- As per claim 17, Naguib et al. and Soliman teach the additional limitations.

Soliman teaches that the system element is a communication station, and the different element is a subscriber unit (page 1, paragraph 4, Soliman).

- As per claim 18, Naguib et al. and Soliman teach the additional limitations.

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Soliman teaches that the system element is a subscriber unit, and the different element is a communication station (page 4, paragraph 30, Soliman).

- As per claim 19, Naguib et al. and Soliman teach the additional limitations.

Claim 19 follows the same limitations as claim 2. See rejection to claim 2, above. Claim 19 is rejected under the same rational as to claim 2 rejected above.

- As per claim 21, Naguib et al. and Soliman teach the additional limitations.

Claim 21 follows the same limitations as claim 4. See rejection to claim 4, above. Claim 21 is rejected under the same rational as to claim 4 rejected above.

- As per claim 22, Naguib et al. and Soliman teach the additional limitations.

Naguib et al. teach the transceiver comprising: a plurality of first stage channel processors, each associated with a communication channel, wherein each generate a spatial composite signal from a plurality of spatially de-correlated signal(s) received from one or more antenna(s) coupled to the system element; and at least one second stage channel processor, coupled to the first stage channel processors to receive at least the spatial composite signal from each of the first stage channel processor(s) perform additional processing and to route the signals to appropriate other network elements to facilitate the communication session (figure 13, pages 87-88, Naguib et al.).

5. Claims 3 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Naguib et al. (Increasing data rate over wireless channels, May 2000, IEEE Signal Processing Magazine, Volume: 17, Issue: 3, Pages: 76-92) and Soliman (US 2002/0114288 A1) as applied to claim 2 and 19 above, and further in view of Molloy et al. (US 6,591,382 B1) and Agrawal et al. (US 5,722,051).

As per claim 3, Naguib et al. and Soliman substantially teach the claimed invention described in claim 2 and 19 (as rejected above). Soliman also teaches a receive signal strength (page 1, paragraph 5, page 3, paragraph 24, page 4, paragraph 29, Soliman) and a signal to noise ratio (SNR), page 7, paragraphs 63, 66, Soliman.

However Naguib et al. and Soliman do not explicitly teach specifically that the monitored one or more operational characteristics include a bit error rate (BER), a frame error rate (FER) and signal to noise and interference ratio (SINR).

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Molloy et al. in an analogous art teach that during data communications, a quality of service monitor constantly monitors the signal quality, via a signal quality indicator (col. 3, lines 7-9, Molloy et al.). Molloy et al. teach that the quality indicator is used to track the bit error rate of data transmissions (col. 9, lines 11-12, Molloy et al.). Molloy et al. teach Signal-to-Noise-and-Interference-Ratio, SINR (col. 9, lines 33-34, Molloy et al.). Molloy et al. teach that if the measured FER is much larger than a projected FER based on the average signal level, then interference is probably present (col. 9, lines 60-63, Molloy et al.).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Naguib et al.'s patent with the teachings of Molloy et al. by including an additional step of monitoring one or more operational characteristics that include a bit error rate (BER), a frame error rate (FER) and signal to noise and interference ratio (SINR).

This modification would have been obvious to one of ordinary skill in the art, at the time the invention was made, because one of ordinary skill in the art would have recognized that it would provide the opportunity to determine the signal quality and implement techniques to improve the signal quality.

Naguib et al. and Soliman also do not explicitly teach specifically a carrier to interference ratio (CIR).

However Agrawal et al. in an analogous art teach that the quality of service may be defined in terms of any of several parameters such as, for example, carrier-to-interference ratio (col. 5, lines 32-34, Agrawal et al.).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Naguib et al.'s patent with the teachings of Agrawal et al. by including an additional step of using a carrier to interference ratio (CIR).

This modification would have been obvious to one of ordinary skill in the art, at the time the invention was made, because one of ordinary skill in the art would have recognized that it would provide the opportunity to determine the signal quality and implement techniques to improve the signal quality.

- Claim 20 follows the same limitations as claim 3. See rejection to claim 3, above. Claim 20 is rejected under the same rationale as to claim 3 rejected above.

6. Claims 5-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Naguib et al.

(Increasing data rate over wireless channels, May 2000, IEEE Signal Processing Magazine, Volume: 17,

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Issue: 3, Pages: 76-92) and Soliman (US 2002/0114288 A1) as applied to claim 1 above, and further in view of Chuang et al. (US 6,052,594) and Schuster et al. (US 6,170,075 B1).

As per claim 5, Naguib et al. and Soliman substantially teach the claimed invention described in claim 1 (as rejected above). Soliman also teaches the weak link component (figures 2, 3, page 7, paragraphs 59-60, Soliman).

However Naguib et al. and Soliman do not explicitly teach the specific use of determining whether an additional channel is available.

Chuang et al. in an analogous art teach that FIG. 2 shows a flow diagram of a process for scanning for available channels performed by a wireless station according to the present invention (figure 2, col. 7, lines 18-20, Chuang et al.).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Naguib et al.'s patent with the teachings of Chuang et al. by including an additional step of determining whether an additional channel is available.

This modification would have been obvious to one of ordinary skill in the art, at the time the invention was made, because one of ordinary skill in the art would have recognized that it would provide the opportunity to use diversity techniques to improve the data rate for the communication link.

Naguib et al. and Soliman also do not explicitly teach the specific use of invoking repetition coding in at least the weak link component to provide channel diversity.

However Schuster et al. in an analogous art teach that these mechanisms may involve adding redundant information to the data stream in an effort to enable a receiving end to reconstruct lost data. This process is commonly employed in wireless communications and is referred to as "channel coding". One of the simplest examples of a channel coder is a repetition coder, which calls for sending duplicates of each packet as a redundant packet (col. 4, lines 20-26, Schuster et al.).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Naguib et al.'s patent with the teachings of Schuster et al. by including an additional step of invoking repetition coding in at least the weak link component to provide channel diversity.

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This modification would have been obvious to one of ordinary skill in the art, at the time the invention was made, because one of ordinary skill in the art would have recognized that it would provide the opportunity to improve the data rate over the wireless channel.

- As per claim 6, Naguib et al., Soliman, Chuang et al. and Schuster et al. teach the additional limitations.

Chuang et al. teach that a channel is a timeslot on a particular carrier frequency (col. 8, lines 37-39, Chuang et al.).

- As per claim 7, Naguib et al., Soliman, Chuang et al. and Schuster et al. teach the additional limitations.

Chuang et al. teach introducing frequency diversity in the signal, wherein each timeslot is dynamically assigned to an independent carrier frequency (col. 7, lines 48-49, col. 8, lines 37-39, Chuang et al.).

Schuster et al. teach repetition-coded signal (col. 4, lines 20-26, Schuster et al.).

- As per claim 8, Naguib et al., Soliman, Chuang et al. and Schuster et al. teach the additional limitations.

Chuang et al. teach determining whether an additional channel is available comprises determining whether a timeslot is available (figure 2, col. 7, lines 18-20, col. 8, lines 37-39, Chuang et al.). Schuster et al. teach repetition coding (col. 4, lines 20-26, Schuster et al.).

- As per claim 9, Naguib et al., Soliman, Chuang et al. and Schuster et al. teach the additional limitations.

Chuang et al. teach multiple channels (col. 8, lines 44-47, Chuang et al.). Naguib et al. teach multiple receive paths (page 77, Naguib et al.). Soliman teaches enabling receipt of the weak link component (page 7, paragraphs 59-60, Soliman).

- As per claim 10, Naguib et al., Soliman, Chuang et al. and Schuster et al. teach the additional limitations.

Naguib et al. teach that enabling receipt via multiple receive paths comprises: receiving through multiple antennae (page 77, Naguib et al.). Soliman teaches the weak link component (page 7, paragraphs 59-60, Soliman).

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7. Claims 11 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Naguib et al. (Increasing data rate over wireless channels, May 2000, IEEE Signal Processing Magazine, Volume: 17, Issue: 3, Pages: 76-92), Soliman (US 2002/0114288 A1), Chuang et al. (US 6,052,594) and Schuster et al. (US 6,170,075 B1) as applied to claim 9 above, and further in view of Balachandran et al. (US 5,881,105).

As per claim 11, Naguib et al., Soliman, Chuang et al. and Schuster et al. substantially teach the claimed invention described in claim 9 (as rejected above). Naguib et al. also teach performing initial spatial processing on at least a temporally first channel by adding energy of each of the signals associated with the channel via the multiple receive paths to form a composite of such signals and combining spatially processed composite signals associated with each of the channels (figure 1, pages 77-78, Naguib et al.). Soliman also teaches the weak link component (figures 2, 3, page 7, paragraphs 59-60, Soliman).

Schuster et al. teach repetition coding (col. 4, lines 20-26, Schuster et al.).

However Naguib et al., Soliman, Chuang et al. and Schuster et al. do not explicitly teach the specific use of performing an error control check on the composite signal and determining if the error control check on the composite signal fails.

Balachandran et al. in an analogous art teach that the CRC block encoding check does not match, i.e. the parity of the transmitted CRC bits does not correspond with that of the generated CRC (col. 10, lines 8-10, Balachandran et al.). Balachandran et al. teach that if the CRC block encoding check does not match, this indicates that the message is invalid (col. 10, lines 29-30, Balachandran et al.).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Naguib et al.'s patent with the teachings of Balachandran et al. by including an additional step of performing an error control check on the composite signal and determining if the error control check on the composite signal fails.

This modification would have been obvious to one of ordinary skill in the art, at the time the invention was made, because one of ordinary skill in the art would have recognized that performing an error control check on the composite signal and determining if the error control check on the composite signal fails

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would provide the opportunity to implement techniques to retransmit the signal if the error check fails, so that it is received correctly at the receiver.

- As per claim 13, Naguib et al., Soliman, Chuang et al., Schuster et al. and Balachandran et al. teach the additional limitations.

Naguib et al. teach demodulating the composite signal (page 89, Naguib et al.).

Balachandran et al. teach extracting error control information from at least a subset of the demodulated signal (col. 1, lines 65-67, col. 2, line 1, col. 10, lines 8-10, Balachandran et al.).

Balachandran et al. teach performing a cyclical redundancy check (CRC) using the error control information to determine whether the demodulated signal matches an originally encoded signal (figure 5, col. 10, lines 8-10, lines 29-31, Balachandran et al.).

8. Claims 12 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Naguib et al. (Increasing data rate over wireless channels, May 2000, IEEE Signal Processing Magazine, Volume: 17, Issue: 3, Pages: 76-92), Soliman (US 2002/0114288 A1), Chuang et al. (US 6,052,594), Schuster et al. (US 6,170,075 B1) and Balachandran et al. (US 5,881,105) as applied to claim 11 and claim 29 above, and further in view of Chin et al. (US 6,694,155 B1).

As per claim 12, Naguib et al., Soliman, Chuang et al., Schuster et al. and Balachandran et al. substantially teach the claimed invention described in claim 11 (as rejected above). Naguib et al. also teach combining each spatially diverse signal representation of the channel received from the multiple receive paths (figure 1, pages 77-78, Naguib et al.).

However Naguib et al., Soliman, Chuang et al., Schuster et al. and Balachandran et al. do not explicitly teach the specific use of utilizing maximal ratio combining (MRC).

Chin et al. in an analogous art teach that this approach, called maximal ratio combining (MRC) approach, is equivalent to keeping the main beam of the downlink beam pattern toward the intended user (col. 3, lines 2-5, Chin et al.).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Naguib et al.'s patent with the teachings of Chin et al. by including an additional step of using maximal ratio combining (MRC).

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This modification would have been obvious to one of ordinary skill in the art, at the time the invention was made, because one of ordinary skill in the art would have recognized that utilizing maximal ratio combining (MRC) would provide the opportunity to keep the main beam of the downlink beam pattern toward the intended user and increase the signal strength.

- As per claim 14, Naguib et al., Soliman, Chuang et al., Schuster et al. and Balachandran et al. and Chin et al. teach the additional limitations.

Naguib et al. teach combining spatially processed composite signals comprises: receiving each of the spatially processed composite signals associated with each channel and combining the spatially composite signals (figure 1, pages 77-78, Naguib et al.). Soliman teaches the weak link component (page 7, paragraphs 59-60, Soliman). Schuster et al. teach repetition coding (col. 4, lines 20-26, Schuster et al.). Chin et al. teach utilizing maximal ratio combining (MRC) to generate a best estimate of the signal transmitted (col. 3, lines 2-5, Chin et al.).

9. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Naguib et al. (Increasing data rate over wireless channels, May 2000, IEEE Signal Processing Magazine, Volume: 17, Issue: 3, Pages: 76-92) and Soliman (US 2002/0114288 A1) as applied to claim 1 above, and further in view of Tolopka et al. (US 6,044,349).

As per claim 15, Naguib et al. and Soliman substantially teach the claimed invention described in claim 1 (as rejected above).

However Naguib et al. and Soliman do not explicitly teach the specific use of a storage medium comprising a plurality of machine executable instructions which, when executed, implement a method. Tolopka et al. in an analogous art teach a machine readable storage medium having stored thereon machine executable instructions, wherein execution of the machine-executable instructions is to implement a method (col. 10, lines 36-39, Tolopka et al.).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Naguib et al.'s patent with the teachings of Tolopka et al. by including an additional step of using a storage medium comprising a plurality of machine executable instructions which, when executed, implement a method.

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This modification would have been obvious to one of ordinary skill in the art, at the time the invention was made, because one of ordinary skill in the art would have recognized that using a storage medium comprising a plurality of machine executable instructions, which when executed, implement a method would provide the opportunity to automate the method and the method will be implemented faster and accurately.

10. Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over Naguib et al. (Increasing data rate over wireless channels, May 2000, IEEE Signal Processing Magazine, Volume: 17, Issue: 3, Pages: 76-92) and Soliman (US 2002/0114288 A1) as applied to claim 22 above, and further in view of Chin et al. (US 6,694,155 B1).

As per claim 23, Naguib et al. and Soliman substantially teach the claimed invention described in claim 22 (as rejected above). Naguib et al. also teach that spatial processing of the received spatially diverse signals to generate a spatial composite of such received signals (figure 1, pages 77-78, Naguib et al.). However Naguib et al. and Soliman do not explicitly teach the specific use of maximal ratio combining (MRC).

Chin et al. in an analogous art teach that this approach, called maximal ratio combining (MRC) approach, is equivalent to keeping the main beam of the downlink beam pattern toward the intended user (col. 3, lines 2-5, Chin et al.).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Naguib et al.'s patent with the teachings of Chin et al. by including an additional step of using maximal ratio combining (MRC).

This modification would have been obvious to one of ordinary skill in the art, at the time the invention was made, because one of ordinary skill in the art would have recognized that utilizing maximal ratio combining (MRC) would provide the opportunity to keep the main beam of the downlink beam pattern toward the intended user and increase the signal strength.

11. Claims 24-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Naguib et al. (Increasing data rate over wireless channels, May 2000, IEEE Signal Processing Magazine, Volume: 17,

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Issue: 3, Pages: 76-92) and Soliman (US 2002/0114288 A1) as applied to claim 22 above, and further in view of Balachandran et al. (US 5,881,105).

As per claim 24, Naguib et al. and Soliman substantially teach the claimed invention described in claim 22 (as rejected above). Naguib et al. also teach that the first stage processors demodulate the spatial composite signal (page 89, Naguib et al.). Naguib et al. teach that combination with other dimensionally de-correlated signals is unnecessary (pages 77-78, Naguib et al.).

However Naguib et al. and Soliman do not explicitly teach the specific use of performing an error check, wherein a positive error check denotes that the transmitted signal has been accurately received.

Balachandran et al. in an analogous art teach that the CRC block encoding check does not match, i.e. the parity of the transmitted CRC bits does not correspond with that of the generated CRC (col. 10, lines 8-10, Balachandran et al.). Balachandran et al. teach that if the CRC block encoding check does not match, this indicates that the message is invalid (col. 10, lines 29-30, Balachandran et al.).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Naguib et al.'s patent with the teachings of Balachandran et al. by including an additional step of performing an error check, wherein a positive error check denotes that the transmitted signal has been accurately received.

This modification would have been obvious to one of ordinary skill in the art, at the time the invention was made, because one of ordinary skill in the art would have recognized that performing an error check, wherein a positive error check denotes that the transmitted signal has been accurately received would provide the opportunity to implement techniques to retransmit the signal if the error check fails, so that it is received correctly at the receiver.

- As per claim 25, Naguib et al., Soliman and Balachandran et al. teach the additional limitations.

Naguib et al. teach that the diversity agent introduces channel diversity in one or more of the wireless communication links (page 77, Naguib et al.). Soliman teaches identifying a weak link component (figures 2, 3, page 7, paragraphs 59-60, Soliman).

12. Claim 26 is rejected under 35 U.S.C. 103(a) as being unpatentable over Naguib et al. (Increasing data rate over wireless channels, May 2000, IEEE Signal Processing Magazine, Volume: 17, Issue: 3,

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Pages: 76-92), Soliman (US 2002/0114288 A1) and Balachandran et al. (US 5,881,105) as applied to claim 25 above, and further in view of Schuster et al. (US 6,170,075 B1).

As per claim 26, Naguib et al., Soliman and Balachandran et al. substantially teach the claimed invention described in claim 25 (as rejected above). Soliman also teaches the weak link component (figures 2, 3, page 7, paragraphs 59-60, Soliman). Naguib et al. teach diversity agent and providing temporally diverse signals (page 77-78, Naguib et al.).

However Naguib et al., Soliman and Balachandran et al. do not explicitly teach the specific use of invoking repetition coding in at least a transmitter of the weak link component to redundantly transmit conversational content on at least two channels.

However Schuster et al. in an analogous art teach that these mechanisms may involve adding redundant information to the data stream in an effort to enable a receiving end to reconstruct lost data. This process is commonly employed in wireless communications and is referred to as "channel coding". One of the simplest examples of a channel coder is a repetition coder, which calls for sending duplicates of each packet as a redundant packet (col. 4, lines 20-26, Schuster et al.).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Naguib et al.'s patent with the teachings of Schuster et al. by including an additional step of invoking repetition coding in at least a transmitter of the weak link component to redundantly transmit conversational content on at least two channels.

This modification would have been obvious to one of ordinary skill in the art, at the time the invention was made, because one of ordinary skill in the art would have recognized that invoking repetition coding in at least a transmitter of the weak link component to redundantly transmit conversational content on at least two channels would provide the opportunity to improve the data rate over the wireless channel and improve the quality of wireless communications.

13. Claims 27-29, 31-33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Naguib et al. (Increasing data rate over wireless channels, May 2000, IEEE Signal Processing Magazine, Volume: 17, Issue: 3, Pages: 76-92), Soliman (US 2002/0114288 A1), Balachandran et al. (US 5,881,105) and

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Schuster et al. (US 6,170,075 B1) as applied to claim 26 above, and further in view of Chuang et al. (US 6,052,594).

As per claim 27, Naguib et al., Soliman, Balachandran et al. and Schuster et al. substantially teach the claimed invention described in claim 26 (as rejected above).

However Naguib et al., Soliman, Balachandran et al. and Schuster et al. do not explicitly teach the specific use of a channel defined as a timeslot-frequency pair.

Chuang et al. in an analogous art teach that a channel is defined to be a particular timeslot of a particular carrier frequency and is designated as (timeslot, carrier frequency), col. 8, lines 37-39, Chuang et al.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Naguib et al.'s patent with the teachings of Chuang et al. by including an additional step of using a channel defined as a timeslot-frequency pair.

This modification would have been obvious to one of ordinary skill in the art, at the time the invention was made, because one of ordinary skill in the art would have recognized that using a channel defined as a timeslot-frequency pair would provide the opportunity to implement diversity techniques for reliable wireless communications using multiple channels.

- As per claim 28, Naguib et al., Soliman, Balachandran et al., Schuster et al. and Chuang et al. teach the additional limitations.

Naguib et al. teach that diversity agent instructs the second stage channel processor to forward the spatial composite signal from a temporally first channel processor to a subsequent channel processor for further processing on the spatial composite signals (figures 1, 13, pages 77-78, 87-88, Naguib et al.).

Soliman teaches the weak link component (figures 2, 3, page 7, paragraphs 59-60, Soliman).

- As per claim 29, Naguib et al., Soliman, Balachandran et al., Schuster et al. and Chuang et al. teach the additional limitations.

Naguib et al. teach that the subsequent channel processor combines its spatial composite signal with a temporally diverse spatial composite received from the temporally first channel processor via the second stage channel processor (figures 1, 13, pages 77-78, 87-88, Naguib et al.).

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- As per claim 31, Naguib et al., Soliman, Balachandran et al., Schuster et al. and Chuang et al. teach the additional limitations.

Chuang et al. teach that each of the channels is dynamically assigned to an independent carrier frequency, providing frequency diverse signals (col. 7, lines 48-49, col. 8, lines 37-39, Chuang et al.).

- As per claim 32, Naguib et al., Soliman, Balachandran et al., Schuster et al. and Chuang et al. teach the additional limitations.

Naguib et al. teach that diversity agent instructs each of channel processor to submit its spatial composite signal to the second stage channel processor, which combines the spatial composite from the temporally first channel processor with temporally diverse spatial composite(s) from one or more additional channel processor(s) to generate a representation of an originally transmitted signal (figures 1, 13, pages 77-78, 87-88, Naguib et al.). Soliman teaches the weak link component (figures 2, 3, page 7, paragraphs 59-60, Soliman).

- As per claim 33, Naguib et al., Soliman, Balachandran et al., Schuster et al. and Chuang et al. teach the additional limitations.

Naguib et al. teach that each of the channels is assigned to an independent carrier frequency, providing frequency diverse signals (page 77, Naguib et al.).

14. Claim 30 is rejected under 35 U.S.C. 103(a) as being unpatentable over Naguib et al. (Increasing data rate over wireless channels, May 2000, IEEE Signal Processing Magazine, Volume: 17, Issue: 3, Pages: 76-92), Soliman (US 2002/0114288 A1), Balachandran et al. (US 5,881,105), Schuster et al. (US 6,170,075 B1) and Chuang et al. (US 6,052,594) as applied to claim 29 above, and further in view of Chin et al. (US 6,694,155 B1).

As per claim 30, Naguib et al., Soliman, Balachandran et al., Schuster et al. and Chuang et al. substantially teach the claimed invention described in claim 29 (as rejected above). Naguib et al. also teach that the subsequent channel processor processes the temporally diverse spatial composite signals (figures 1, 13, pages 77-78, 87-88, Naguib et al.).

However Naguib et al., Soliman, Balachandran et al., Schuster et al. and Chuang et al. do not explicitly teach the specific use of utilization of maximal ratio combining, MRC.

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Chin et al. in an analogous art teach that this approach, called maximal ratio combining (MRC) approach, is equivalent to keeping the main beam of the downlink beam pattern toward the intended user (col. 3, lines 2-5, Chin et al.).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Naguib et al.'s patent with the teachings of Chin et al. by including an additional step of using maximal ratio combining (MRC).

This modification would have been obvious to one of ordinary skill in the art, at the time the invention was made, because one of ordinary skill in the art would have recognized that utilizing maximal ratio combining (MRC) would provide the opportunity to keep the main beam of the downlink beam pattern toward the intended user and increase the signal strength.

15. Claim 34 is rejected under 35 U.S.C. 103(a) as being unpatentable over Naguib et al. (Increasing data rate over wireless channels, May 2000, IEEE Signal Processing Magazine, Volume: 17, Issue: 3, Pages: 76-92) and Soliman (US 2002/0114288 A1) as applied to claim 16 above, and further in view of Kyllonen (US 5,819,174).

As per claim 34, over Naguib et al. and Soliman substantially teach the claimed invention described in claim 16 (as rejected above). Naguib et al. teach wireless communication system (pages 77-78, Naguib et al.). Naguib et al. also teach implementing one or more functions of the multidimensional diversity agent (pages 77-78, Naguib et al.).

However Naguib et al. and Soliman do not explicitly teach the specific use of control logic, to control one or more operational aspects of the element; and a memory device, coupled to the control logic, including a plurality of executable instructions which, when executed by the control logic implement one or more functions.

Kyllonen in an analogous art teaches a controller that is bidirectionally coupled to a memory and to the transceiver, the controller executing instructions for implementing a plurality of tasks, including an initialization task, a system access task, an idle task, and a response to an incoming call task (col. 6, lines 40-44, Kyllonen).

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Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Naguib et al.'s patent with the teachings of Kyllonen by including an additional step of using control logic, to control one or more operational aspects of the element; and a memory device, coupled to the control logic, including a plurality of executable instructions which, when executed by the control logic implement one or more functions.

This modification would have been obvious to one of ordinary skill in the art, at the time the invention was made, because one of ordinary skill in the art would have recognized that it would provide the opportunity to automate the multidimensional diversity techniques and conduct the tasks faster and accurately for the wireless communications.

16. Claims 35-36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Naguib et al. (Increasing data rate over wireless channels, May 2000, IEEE Signal Processing Magazine, Volume: 17, Issue: 3, Pages: 76-92) in view of Soliman (US 2002/0114288 A1) and Tolopka et al. (US 6,044,349). As per claim 35, Naguib et al. teach to implement a multidimensional diversity agent to selectively introduce multidimensional diversity to generate a plurality of de-correlated signals and to selectively combine received ones of the plurality of de-correlated signals which, when demodulated, provide a representation of content originally transmitted in the received signals (figure 13, pages 77, 85-86, 89, Naguib et al.).

However Naguib et al. do not explicitly teach the specific use of identifying a weak link component of a wireless communication link.

Soliman in an analogous art teaches that this invention relates to digital wireless communication systems (page 1, paragraph 2). Soliman also teaches detecting and processing calls in a weak forward link environment. The method shown in FIGS. 2 and 3 detects whether a forward link failure is due to a weak forward link, and processes calls appropriately (figures 2, 3, page 7, paragraphs 59-60, Soliman).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Naguib et al.'s patent with the teachings of Soliman by including an additional step of identifying a weak link component of a wireless communication link

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This modification would have been obvious to one of ordinary skill in the art, at the time the invention was made, because one of ordinary skill in the art would have recognized that identifying a weak link component of a wireless communication link would provide the opportunity to use diversity techniques to improve the data rate.

Naguib et al. also do not explicitly teach the specific use of a machine accessible storage device comprising a plurality of executable instructions which, when executed by an accessing machine implement a process.

However Tolopka et al. in an analogous art teach a machine readable storage medium having stored thereon machine executable instructions, wherein execution of the machine-executable instructions is to implement a method (col. 10, lines 36-39, Tolopka et al.).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Naguib et al.'s patent with the teachings of Tolopka et al. by including an additional step of using a machine accessible storage device comprising a plurality of executable instructions which, when executed by an accessing machine implement a process.

This modification would have been obvious to one of ordinary skill in the art, at the time the invention was made, because one of ordinary skill in the art would have recognized that using a machine accessible storage device comprising a plurality of executable instructions which, when executed by an accessing machine implement a process would provide the opportunity to automate the process and the process will be implemented faster and accurately.

- As per claim 36, Naguib et al., Soliman and Tolopka et al. teach the additional limitations.

Tolopka et al. teach a machine accessible storage device further comprising instructions that are executed (col. 10, lines 36-39, Tolopka et al.). Soliman teaches monitoring one or more operational characteristics of the wireless communication link for an indication of weakness in one or more of the link components (page 1, paragraphs 2, 5, page 3, paragraph 28, Soliman).

17. Claim 37 is rejected under 35 U.S.C. 103(a) as being unpatentable over Naguib et al. (Increasing data rate over wireless channels, May 2000, IEEE Signal Processing Magazine, Volume: 17, Issue: 3,

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Pages: 76-92), Soliman (US 2002/0114288 A1) and Tolopka et al. (US 6,044,349) as applied to claim 36 above, and further in view of Molloy et al. (US 6,591,382 B1) and Agrawal et al. (US 5,722,051).

As per claim 37, Naguib et al., Soliman and Tolopka et al. substantially teach the claimed invention described in claim 36 (as rejected above). Soliman also teaches a receive signal strength (page 1, paragraph 5, page 3, paragraph 24, page 4, paragraph 29, Soliman) and a signal to noise ratio (SNR), page 7, paragraphs 63, 66, Soliman.

However Naguib et al., Soliman and Tolopka et al. do not explicitly teach the specific use of monitoring a bit error rate (BER), a frame error rate (FER) and signal to noise and interference ratio (SINR).

Molloy et al. in an analogous art teach that during data communications, a quality of service monitor constantly monitors the signal quality, via a signal quality indicator (col. 3, lines 7-9, Molloy et al.). Molloy et al. teach that the quality indicator is used to track the bit error rate of data transmissions (col. 9, lines 11-12, Molloy et al.). Molloy et al. teach Signal-to-Noise-and-Interference-Ratio, SINR (col. 9, lines 33-34, Molloy et al.). Molloy et al. teach that if the measured FER is much larger than a projected FER based on the average signal level, then interference is probably present (col. 9, lines 60-63, Molloy et al.).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Naguib et al.'s patent with the teachings of Molloy et al. by including an additional step of monitoring a bit error rate (BER), a frame error rate (FER) and signal to noise and interference ratio (SINR).

This modification would have been obvious to one of ordinary skill in the art, at the time the invention was made, because one of ordinary skill in the art would have recognized that it would provide the opportunity to determine the signal quality and implement techniques to improve the signal quality.

Naguib et al., Soliman and Tolopka et al. also do not explicitly teach specifically a carrier to interference ratio (CIR).

However Agrawal et al. in an analogous art teach that the quality of service may be defined in terms of any of several parameters such as, for example, carrier-to-interference ratio (col. 5, lines 32-34, Agrawal et al.).

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Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Naguib et al.'s patent with the teachings of Agrawal et al. by including an additional step of using a carrier to interference ratio (CIR).

This modification would have been obvious to one of ordinary skill in the art, at the time the invention was made, because one of ordinary skill in the art would have recognized that it would provide the opportunity to determine the signal quality and implement techniques to improve the signal quality.

18. Claims 38-39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Naguib et al. (Increasing data rate over wireless channels, May 2000, IEEE Signal Processing Magazine, Volume: 17, Issue: 3, Pages: 76-92), Soliman (US 2002/0114288 A1) and Tolopka et al. (US 6,044,349) as applied to claim 35 above, and further in view of Schuster et al. (US 6,170,075 B1).

As per claim 38, Naguib et al., Soliman and Tolopka et al. substantially teach the claimed invention described in claim 35 (as rejected above). Soliman also teaches the weak link component (figures 2, 3, page 7, paragraphs 59-60, Soliman). Tolopka et al. teach an executing machine to issue an instruction (col. 10, lines 36-39, Tolopka et al.). Naguib et al. teach the diversity agent, transmitter and introducing temporally diverse signals (figure 1, pages 77-78, Naguib et al.).

However Naguib et al., Soliman and Tolopka et al. do not explicitly teach the specific use of invoking repetition coding.

Schuster et al. in an analogous art teach that these mechanisms may involve adding redundant information to the data stream in an effort to enable a receiving end to reconstruct lost data. This process is commonly employed in wireless communications and is referred to as "channel coding". One of the simplest examples of a channel coder is a repetition coder, which calls for sending duplicates of each packet as a redundant packet (col. 4, lines 20-26, Schuster et al.).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Naguib et al.'s patent with the teachings of Schuster et al. by including an additional step of invoking repetition coding.

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This modification would have been obvious to one of ordinary skill in the art, at the time the invention was made, because one of ordinary skill in the art would have recognized that invoking repetition coding would provide the opportunity to improve the data rate over the wireless channel.

- As per claim 39, Naguib et al., Soliman, Tolopka et al. and Schuster et al. teach the additional limitations.

Naguib et al. teach the diversity agent and to combine spatially diverse signals to generate a spatial composite within each channel and to combine the spatial composites for each temporally diverse channel to generate a representation of the originally transmitted signal (figure 1, 13, pages 77-78, 85-89, Naguib et al.). Soliman also teaches the weak link component (figures 2, 3, page 7, paragraphs 59-60, Soliman).

19. Claim 40 is rejected under 35 U.S.C. 103(a) as being unpatentable over Naguib et al. (Increasing data rate over wireless channels, May 2000, IEEE Signal Processing Magazine, Volume: 17, Issue: 3, Pages: 76-92), Soliman (US 2002/0114288 A1) and Tolopka et al. (US 6,044,349) and Schuster et al. (US 6,170,075 B1) as applied to claim 39 above, and further in view of Balachandran et al. (US 5,881,105).

As per claim 40, Naguib et al., Soliman, Tolopka et al. and Schuster et al. substantially teach the claimed invention described in claim 39 (as rejected above). Naguib et al. teach the diversity agent, combining the spatial composites and demodulated spatial composites associated with the temporally diverse channels (figure 1, 13, pages 77-78, 85-89, Naguib et al.).

However Naguib et al., Soliman, Tolopka et al. and Schuster et al. do not explicitly teach the specific use of an error check failure.

Balachandran et al. in an analogous art teach that the CRC block encoding check does not match, i.e. the parity of the transmitted CRC bits does not correspond with that of the generated CRC (col. 10, lines 8-10, Balachandran et al.). Balachandran et al. teach that if the CRC block encoding check does not match, this indicates that the message is invalid (col. 10, lines 29-30, Balachandran et al.).

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Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Naguib et al.'s patent with the teachings of Balachandran et al. by including an additional step of use of an error check failure.

This modification would have been obvious to one of ordinary skill in the art, at the time the invention was made, because one of ordinary skill in the art would have recognized that use of an error check failure would provide the opportunity to implement techniques to retransmit the signal if the error check fails, so that it is received correctly at the receiver.

Claim Objections

20. Claims 35 and 39 objected to because of the following informalities: Indentation is required. Appropriate correction is required.

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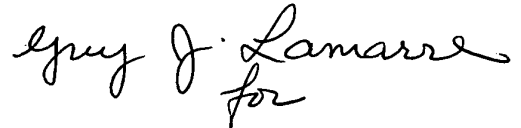
20. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dipakkumar Gandhi whose telephone number is 703-305-7853. The examiner can normally be reached on 8:30 AM - 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Albert Decady can be reached on (703) 305-9595. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Dipakkumar Gandhi
Patent Examiner



Albert DeCady
Primary Examiner